

## METHOD AND ARRANGEMENT IN FIBRE-LIKE PRODUCT PROCESSING

**[0001]** The invention relates to a method in connection with processing a fibre-like product, in which method a first fibre-like product is guided from delivery of the fibre-like product via a process-implementing unit forward in the process and when the first fibre-like product ends a new fibre-like product is guided to the process-implementing unit and further through it, whereby the new fibre-like product is guided in advance to be ready in the vicinity of the process-implementing unit. The invention also relates to an arrangement in connection with processing a fibre-like product.

**[0002]** In processes of various fibre-like products, for instance optical fibre coating processes, such as tight-buffer processes, when a fibre ends, a buffer supplied from a press head also breaks in prior art solutions. As a result, the line operator has earlier been compelled to manually supply the buffer again through the line, in other words, to restart the process. In such a restart tens of metres of fibre are easily wasted, which raises the costs due to the loss of material. Another problem has been that the manual supply is difficult and slow to perform, which further raises the costs and reduces the degree of utilization of the line. Moreover, manual supply is also an obvious security risk.

**[0003]** To eliminate the above drawbacks there have been proposed various solutions, which would allow automation of the above-mentioned manual supply. An example of the automated solutions is the one disclosed in US Patent 6,534,122. The solution set forth in US Patent 6,534,122 works well, in principle, but timing of the movements of fibre-drawing rolls has posed a problem.

**[0004]** It is an object of the invention to provide a method and an arrangement, which eliminate the drawbacks in the prior art. This is achieved with the method and the arrangement of the invention. The method of the invention is characterized in that the new fibre-like product is gripped such that the new fibre-like product is locked into place and forced in a curved position onto a backing surface, that as the first fibre-like product ends the locking is released first from the base of the curved portion and in front thereof, whereby the new fibre-like product straightens out and the first end of the product moves forward and that thereafter the locking is released from other parts of the backing surface, whereby the tail end of the first fibre-like product draws the new fibre-like product onwards at a speed equal to that of the line. The arrangement of the invention, in turn, is characterized in that the arrangement

comprises a gripping unit having a backing surface provided with a curved portion, that the new fibre-like product is arranged for locking into place such that the product is pressed against the backing surface in a curved shape defined by the backing surface, that as the first fibre-like product ends the locking between the new fibre-like product and the curved portion of the backing surface and the portion in front thereof is arranged for being released first, whereby the new fibre-like product straightens out and the first end of the product moves onwards and only thereafter the locking is arranged for being released from other portions of the backing surface, whereby the tail end of the first fibre-like product is arranged to draw along the new fibre-like product at a speed equal to that of the line.

**[0005]** A primary advantage of the invention is that it avoids the time-consuming and difficult manual restart and fibre is wasted as little as possible and it is also possible to avoid all timing problems associated with gripping and releasing. The invention thus provides economic advantages thanks to reduced fibre costs and improved degree of utilization of the line. Further, the structure of the arrangement of the invention is simple and reliable in use, because in practice it does not comprise any moving parts. The invention also improves the operational safety of the line, because the operator does not have to supply the fibre manually through the whole line or to feed new fibre into the process during the ongoing process.

**[0006]** In the following the invention will be described in greater detail by means of an embodiment appearing in the attached drawings, in which

Figure 1 is a schematic general view of a fibre coating line;

Figure 2 is a schematic side view of an arrangement of the invention;

Figure 3 shows the arrangement of Figure 2 seen in the travel direction of the fibre; and

Figure 4 shows a top view of the arrangement of Figures 2 and 3.

**[0007]** Figure 1 shows generally a line used for coating an optical fibre. In Figure 1, reference numeral 1 generally denotes fibre deliveries and reference numeral 2 generally denotes a press apparatus comprising an actual press head and other means which are used to provide the surface of the optical fibre with a coating. The optical fibre is denoted by reference numeral 3 in Figure 1. In Figure 1, reference numeral 4 generally denotes means employed for cooling the coated fibre, and correspondingly, reference numeral 5 denotes

means for winding the coated fibre onto a reel. Reference numeral 10 in Figure 1 denotes an arrangement of the invention, reference numeral 11 denotes a diameter measuring device and reference numeral 12 denotes a pulling device for an optical fibre cable. Reference numeral 13 in Figure 1 denotes a line control unit.

**[0008]** The above details constitute fully conventional technology to those skilled in the art, so they will not be described in greater detail herein.

**[0009]** When a fibre is coated on a line shown in Figure 1, in prior art solutions the coating process interrupted as the fibre from fibre delivery 1 ran out, and the operator was compelled to supply a new fibre manually from the fibre delivery through the line. However, this kind of procedure causes problems as described above.

**[0010]** The invention relates to a method and an arrangement which enable fibre coating as a continuous process. Thus, during the process the line operator may prepare a new fibre to be ready when the old fibre runs out. When the old fibre runs out, the arrangement of the invention feeds a new fibre without interruption in the process to the press head. The fibre joint can be marked and removed in subsequent process steps.

**[0011]** The arrangement of the invention is depicted in Figures 2, 3 and 4. The arrangement of Figures 2, 3 and 4 is placed on the coating line at a point immediately preceding the press head of the press apparatus 2 as shown in Figure 1. In Figures 2, 3 and 4, the first fibre-like product is denoted by reference numeral 3a and a new fibre-like product by reference numeral 3b.

**[0012]** The arrangement 10 of the invention comprises a gripping unit 14, in which there is a backing surface 15 provided with a curved portion. In accordance with the basic idea of the invention the new fibre-like product 3b is arranged for being locked into place such that the product 3b is pressed against the backing surface 15 into a curved shape defined by the backing surface. The new fibre-like product 3b is bent and pressed against the backing surface 15 such that the product follows the shape of the backing surface as shown in Figure 2. The new fibre-like product 3b is maintained in the position against the backing surface 15 such that in view of its elastic properties/elasticity it will not be able to straighten out to a position, in which the first fibre-like product is shown in Figure 2.

**[0013]** When the first fibre-like product 3a runs out the locking between the new fibre-like product 3b and the curved portion of the backing sur-

face 15 and the portion in front of the curved portion is arranged for being released first, whereby the new fibre-like product 3b straightens out due to its elastic properties and the first end of the product 3b moves forward towards a fibre needle 16 in the press head. The expression "the portion of the backing surface in front of the curved portion" refers here to the portion of the backing surface that is located in the vicinity of the fibre needle, for instance the portion of the backing surface on the right side of the curved portion in Figure 2. The first end of the product 3b moves forward towards the fibre needle only a very short distance, in practice a few millimetres, but said transfer is sufficient because the new product 3b is close to the product 3a and the fibre needle is tight. The locking between the new product 3b and the backing surface 15 is only thereafter arranged for being released for other portions of the backing surface, whereby the tail end of the first fibre-like product 3a is arranged to draw along a new fibre-like product 3b at a speed that is equal to that of the line. The friction between the surfaces of products 3a and 3b is relatively high, which enables the above-described procedure.

**[0014]** There are various ways to implement the locking of the new fibre-like product 3b to the backing surface 15. Utilization of pressure difference is found to be particularly advantageous. The pressure difference can be provided, for instance, by suction effect, as in the examples of the figures. In Figure 2, reference numeral 17 denotes the channels, by means of which the product 3b is sucked against the backing surface 15. The backing surface may consist, for instance, of a groove formed between two plate-like parts, at the bottom of which groove the above-mentioned channels 17 open. Suction control to allow termination of the suction effect first at the curved portion of the backing surface can be implemented in any suitable manner. Partial vacuum can be produced by means of any apparatus known per se.

**[0015]** Naturally, in connection with releasing the locking, it is possible to use blowing to assist in the release, which makes sure that the new product straightens out in a desired manner at the area of the curved portion of the backing surface as described above. The same channels 17 are used for the blowing as for providing the suction effect. This contributory operation is particularly advantageous to those fibre-like products whose elastic properties are such that they are not fully sufficient for straightening the product after termination of the suction effect.

**[0016]** The gripping unit 14 of the arrangement of the invention con-

sists of a movable unit as shown in Figure 2, in which a second position of the gripping unit, in other words a preparation position, is indicated by broken lines. The line operator may prepare a new fibre-like product 3b ready for the gripping unit as the process goes on. After the preparation the gripping unit is lifted to a higher position to wait for a change. The higher position is indicated in Figure 2 by a continuous line. The apparatus is advantageously designed such that as the gripping unit rises to the higher position it also finishes the end of the new fibre-like product, in other words, it cuts the end in a correct manner, for instance. The above feature is shown in Figure 2, in which the end of the new fibre-like product appears in the preparation position, indicated by broken lines, as a part that extends over the gripping unit 14. After the change, the gripping unit can be lowered back to its lower position and the operator may start preparing another change as the process goes on. The arrow in Figure 2 shows the motion of the gripping unit.

**[0017]** The above-described embodiment of the invention is not intended to restrict the invention in any way, but it can be modified fully freely within the scope of the claims. Thus, it is obvious that the arrangement of the invention or the details thereof need not necessarily be the same as those shown in the figures, but other solutions are also possible. In the above-described example the invention is applied in connection with a press head. However, the invention is not restricted to said feature or to optical fibres only. The invention can be applied in connection with all kinds of fibre-like products, irrespective of the material or the number of the products, etc. In the example of the figures the product is locked to the backing surface with suction. However, this is not the only option, but the product can also be locked by means of blow effect whereas suction can be used as a contributory factor for releasing. Various mechanical solutions, such as use of springs and other similar elements, is possible in some applications, for instance, for assisting in the release, etc.